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UF-8075

B. E. II (Sem. III) (EC) Examination

May/June – 2012

Electrical Machines

(New Course)

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. II (Sem. III) (EC)

Name of the Subject :

☛ Electrical Machines (New Course)

☛ Subject Code No. : 8 0 7 5 ☛ Section No. (1, 2,.....) : Nil

Seat No. :

Student's Signature

(2) Answer all questions.

(3) Figures on right hand side indicate marks.

(4) Assume suitable data whatever is necessary.

(5) Scientific calculator fx100 or equivalent is permissible.

1 (a) Fill in the blanks. **10**

(1) Transformer ratings are usually expressed in terms of _____ (kW, kVA).

(2) Transfomer core is laminated to reduce _____ loss. (eddy current, hysteresis current)

(3) The most popular method of connecting three phase transformer is the _____ connection. (star/delta, delta/star)

(4) The principle of operation of a transofrmer is based upon _____ induciton. (mutual, self)

(5) Scott connections are used for three phase to _____ phase conversion. (one, two)

(6) Open circuit test on a transformer gives _____ loss. (copper, core)

(7) The end rings in rotor of cage type induction motor acts as a _____ circuit on the individual rotor bar. (open, short)

(8) The slip of induction motor at synchronous speed will be _____ (one, zero)

(9) A 6pole, 50Hz induction motor rotation at 1440 rpm is in _____ mode. (motoring, generating)

(10) We can connect external resistance to the rotor of _____ induction motor. (squirrel cage, slip ring)

(b) Explain the construction and working of three phase induction motor. **10**

2 (a) Explain the no load and short circuit test of single phase transformer and show that from test results, how constants of equivalent circuit can be determined ? **7**

(b) A 15kVA, 2300/230V, 50Hz single phase transformer gave the following test results. **8**
O.C. Test : Vo=2300V, Io=0.21A, Wo=50W.
S.C. Test : Vs=47V, Is=6A, Ws=160W.
Find the equivalent circuit referred to high voltage side.

OR

(a) Discuss open delta connection of three phase transformer with necessary circuit and vector diagram. **7**

(b) Explain the working of a single phase transformer. Also derive its emf equation. **8**

3 Attempt any three. **15**

(1) Define slip of a three phase induction motor. Explain its torque-speed characteristics.

(2) State various starting methods of a three phase induction motor and explain any one in details.

(3) Write a short note on autotransformer.

(4) Explian various losses in a transformer.

4 (a) Fill in the blanks. **10**

(1) The armature of a dc machine is made up of _____. (cast steel, cast iron)

(2) The emf induced in a dc generator is _____ induced emf. (dynamically, electromagnetically)

(3) A dc machine armature is laminated to reduce _____ loss. (eddy current, hyteresis)

(4) In dc series motor the field winding is connected in _____ with the armature winding. (parallel, series)

(5) An alternator is sometimes called as _____ generator. (induction, synchronous)

(6) In dc motor majority of losses occurs in _____. (core, armature)

(7) The frequency of emf generated by alternator is _____ proportional to speed. (inversely, directly)

(8) Commutator converts _____. (ac to dc, dc to ac)

(9) Cylindrical rotor alternator has _____ speed. (high, low)

(10) Alternator rotates at _____ speed. (synchronous, variable)

(b) What is critical resistance of a dc shunt generator ? What is its significance ? **4**

(c) On which basis dc generators are classified. Give detailed classification of generator with relevant diagrams. **6**

5 (a) What is synchronization of alternators ? Which conditions must be satisfied for proper synchronization of three phase alternators ? **7**

(b) A 4 pole dc shunt generator with wave connected armature has 41 slots and 12 conductors per slot. Armature resistance $Ra = 0.5\Omega$, shunt resistance $Rsh = 200\Omega$ and flux per pole is 125mwb. Calculate the voltage across a 10Ω load resistance connected across the armature terminals. **8**

OR

(a) Discuss different methods of speed control of a dc shunt motor. **7**

(b) What is regulation ? Explain any one method for finding regulation of an alternator. **8**

6 Attempt any three. **15**

(1) Explain the load characteristics of a dc shunt generator.

(2) Explain armature reaction in dc machine.

(3) Define salient pole alternator and non salient pole alternator and differentiate the two.

(4) Explain various types of losses in a dc generator.
